

GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL (COMPUTER AIDED PROCESS DESIGN) (16)

Natural Gas Engineering

SUBJECT CODE: 3711613

SEMESTER: I

Type of course: Program Elective - 2

Prerequisite: NIL

Rationale: To impart knowledge regarding natural gas production and its engineering aspects to meet the requirement of skilled manpower in dynamic hydrocarbon industry.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE(E)	PA (M)	PA (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Content

Sl. No.	Topic	Teaching Hours	Module Weightage (%)
1	Introduction: Understanding natural gas, estimation of gas reserves and non associated gas reserves, world natural gas/LNG scenario.	5	10
2	Properties: Phase behaviour fundamentals, properties of natural gases, gas and liquid separation.	5	10
3	Natural Gas Hydrates: Natural gas hydrates, hydrate thermodynamics and formation kinetics, hydrate exploitation.	8	14
4	Gas Dehydration: Gas-water system, water content determination, glycol dehydration, solid bed dehydration.	6	12
5	Acid Gas Treating: Gas sweetening processes, solid bed adsorption, chemical and physical solvent processes, desulphurization, sulphide distillation, gas permeation.	6	12
6	Gas Processing: Absorption, refrigeration, fractionation and design consideration, design procedures for iron sponge units and amine systems.	8	14
5	Gas Hydrates: Determination of hydrate formation temperature/ pressure, condensation of water vapour, temperature drop due to gas expansion, thermodynamic inhibitors, kinetic inhibitors and anti agglomerates.	6	10
6	Gas Engineering: Steady state flow of gas through pipes, multiphase gas liquid flow, gas compression, gas flow measurement, gas gathering and transport.	6	10
7	Economics: Business aspects and market trends.	4	8

Reference Books:

1. William C. L., "Standard Handbook of Petroleum and Natural Gas Engineering", Vol. 2, 6th Ed., Gulf Publishing Company.
2. Arnold K. and Steward M., "Surface Production Operations: Design of Gas Handling Systems and Functions", Butter Worth Heinemann.
3. Arnold K. and Steward M., "Surface Production Operations: Design of Gas Handling Systems and Functions", Butter Worth Heinemann.
4. Kidney A. J. and Prvish W. R., "Fundamentals of Natural Gas Possessing", CRC.

Course Outcome: After learning the course the students should be able to:

1. Understand fundamentals, characteristics and commercial aspects of natural gas.
2. Comprehend natural gas treatment processes and analyze problem associated with the treatment techniques.
3. Explain hydrates formation thermodynamics and kinetics.
4. Describe transport and flow characteristics of natural gas.